

**Study Guide**

For use with pages 78–83

**GOAL** Simplify variable expressions.**VOCABULARY**

The parts of an expression that are added together are called **terms**. The **coefficient** of a term with a variable is the number part of the term. A **constant term**, such as 7, has a number but no variable. **Like terms** are terms that have identical variable parts.

**EXAMPLE 1** Identifying Parts of an Expression

Identify the terms, like terms, coefficients, and constant terms of the expression  $2y^3 - 7 + 2y - y^3 + 3$ .

**Solution**

(1) Write the expression as a sum:  $2y^3 + (-7) + 2y + (-y^3) + 3$ .

(2) Identify the parts of the expression. Note that because  $-y^3 = -1y^3$ , the coefficient of  $-y^3$  is  $-1$ .

**Terms:**  $2y^3$ ,  $-7$ ,  $2y$ ,  $-y^3$ ,  $3$

**Like terms:**  $2y^3$  and  $-y^3$ ;  $-7$  and  $3$

**Coefficients:**  $2$ ,  $2$ ,  $-1$

**Constant terms:**  $-7$ ,  $3$

**Exercises for Example 1**

For the given expression, identify the terms, like terms, coefficients, and constant terms.

1.  $9t^2 - 12t + t^2 - 1$

2.  $11m^4 + 4m - 5 - 15m$

3.  $5y - 3 + 2y$

**EXAMPLE 2** Simplifying an Expression

$$\begin{aligned} 17x^2 + 2 + x^2 - 5 &= 17x^2 + 2 + x^2 + (-5) \\ &= 17x^2 + x^2 + 2 + (-5) \\ &= 17x^2 + 1x^2 + 2 + (-5) \\ &= (17 + 1)x^2 + 2 + (-5) \\ &= 18x^2 - 3 \end{aligned}$$

Write as a sum.

Commutative property

Coefficient of  $x^2$  is 1.

Distributive property

Simplify.

**Exercises for Example 2**

Simplify the expression.

4.  $3x - 21 - 7x + 20$

5.  $2y^5 + 5y - y^5 + 5$

6.  $11z^3 - 3z - 3 + z^3 + 2z$

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**EXAMPLE 3 Simplifying Expressions with Parentheses**

- a.  $5(x - 2) - 9x + 11 = 5x - 10 - 9x + 11$  Distributive property  
 $= 5x - 9x - 10 + 11$  Group like terms.  
 $= -4x + 1$  Combine like terms.
- b.  $6x - (8 - 14x) + 1 = 6x - 1(8 - 14x) + 1$  Identity property  
 $= 6x - 8 + 14x + 1$  Distributive property  
 $= 6x + 14x - 8 + 1$  Group like terms.  
 $= 20x - 7$  Combine like terms.

**Exercises for Example 3**

Simplify the expression.

7.  $5y + 7(2y + 1) - 5$       8.  $8k - 5 + 5(2k - 3) - 7$       9.  $11n - (n - 5) + 3n$

**EXAMPLE 4 Writing and Simplifying an Expression**

You spend a total of 50 minutes talking long-distance to your friend and grandparents. It costs 4 cents per minute to call your friend and 6 cents per minute to call your grandparents.

- a. Let  $t$  be the time you talk with your friend (in minutes). Write an expression in terms of  $t$  for the cost of both phone calls.
- b. Find the cost of the phone calls if you talk with your friend for 25 minutes.

**Solution**

- a. Write a verbal model for the cost of the phone calls.

Long-distance rate for calling friend	•	Length of call with friend	+	Long-distance rate for calling grandparents	•	Length of call with grandparents
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$$0.04t + 0.06(50 - t) = 0.04t + 3 - 0.06t \quad \text{Distributive property}$$

$$= 3 - 0.02t \quad \text{Combine like terms.}$$

- b. Evaluate the expression in part (a) when  $t = 25$ .

$$3 - 0.02t = 3 - 0.02(25) = \$2.50$$

**Exercise for Example 4**

10. You spend a total of 25 minutes typing an e-mail to your friend and writing a letter to your aunt. You can type 60 words per minute and handwrite 20 words per minute. Let  $m$  be the number of minutes you type the e-mail to your friend. Write an expression in terms of  $m$  for the total number of words you wrote. Evaluate the expression if you spend 10 minutes typing the e-mail to your friend.